

What is claimed is:

1. A heat-setting label sheet, which comprises:
  - (i) a support;
  - (ii) a pressure sensitive adhesive layer comprising at least one of a polyester, acrylic polymer, or copolymer blend, said polyester, acrylic polymer or copolymer blend having a glass transition temperature (Tg) of less than 0°C;
  - (iii) an Adhesion Layer comprising a thermoplastic polymer which melts in the range of 50-250°C, a wax which melts in the range of 50-250°C, or combinations thereof;
  - (iv) an optional opaque layer comprising a styrene-butadiene latex, thermoplastic polymer, elastomer and optional pigment;
  - (v) a second optional opaque layer comprising vinyl acetate-ethylene copolymer, thermoplastic elastomer, elastomer and optional pigment.
2. The heat-setting label sheet claim 1, further comprising (vi) an image receiving layer which comprises at least one polymer which is capable of receiving and retaining water base colorants, said image receiving layer either does not melt when heat is applied or melts at a temperature above the melting temperature of the Adhesion Layer.
3. The heat-setting label sheet of claim 2, wherein said image receiving layer does not melt below 200°C.
4. The heat-setting label sheet of claim 2, wherein said image receiving layer comprises polyvinyl alcohol,

amine polymer, thermoplastic polymer, thermoplastic elastomer, and an antioxidant.

5. The heat-setting label sheet of claim 1, wherein said pressure sensitive adhesive layer comprises an acrylic polymer adhesive.

6. The heat-setting label sheet of claim 1, wherein said support is selected from the group consisting of a cellulosic nonwoven web and polyester film.

7. The heat-setting label sheet of claim 1, wherein said support is a silicone film.

8. The heat-setting label sheet of claim 1, wherein an adhesive is placed between the support and the Adhesion Layer.

9. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a thermoplastic polymer which melts in a range of from about 65°C to about 180°C and has a solubility parameter at least about 19 (Mpa)<sup>1/2</sup>.

10. The heat-setting label sheet of claim 2, wherein said image receiving layer further comprises an oxidized polyethylene homopolymer.

11. The heat-setting label sheet of claim 2, wherein said image receiving layer further comprises an ethylene vinyl acetate copolymer powder.

12. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a polymeric composition

comprising: an acrylic dispersion, an elastomeric emulsion, a water repellent and a plasticizer.

13. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a polymeric composition comprising a film forming binder, an elastomeric emulsion, a water repellent and a plasticizer.

14. The heat-setting label sheet of claim 12, wherein said acrylic dispersion is an ethylene acrylic acid dispersion, said water repellent is a polyurethane dispersion and said plasticizer is a polyethylene glycol.

15. The heat-setting label sheet of claim 14, wherein said ethylene acrylic acid dispersion melts in the range of from about 65°C to about 180°C.

16. The heat-setting label sheet of claim 13, wherein said elastomeric emulsion has a Tg in the range of from -50°C to 25°C.

17. The heat-setting label sheet of claim 14, wherein said polyurethane dispersion has a Tg in the range of from -50°C to 25°C.

18. The heat-setting label sheet of claim 14, wherein said ethylene acrylic acid dispersion is present in an amount of from 46 to 90 parts by weight; said elastomeric emulsion is present in an amount of from 1 to 45 parts by weight; said polyurethane dispersion is present in an amount of from 1 to 7 parts by weight; and said polyethylene glycol is present in an amount of from 1 to 8 parts by weight.

19. The heat-setting label sheet of claim 14, wherein said ethylene acrylic acid dispersion is present in an amount of 86 parts by weight; said elastomeric emulsion is present in an amount of 5 parts by weight; said polyurethane dispersion is present in an amount of 4 parts by weight; and said polyethylene glycol is present in an amount of 4 parts by weight.

20. The heat-setting label sheet of claim 13, which further comprises a polyethylene glycol mono ((tetramethyl butyl) phenol) ester compound.

21. The heat-setting label sheet of claim 13, wherein the elastomeric emulsion is selected from the group consisting of polybutadiene, polybutadiene derivatives, polyurethane, polyurethane derivatives, styrene-butadiene, styrenebutadiene-styrene, acrylonitrile-butadiene, acrylonitrilebutadiene-styrene, acrylonitrile-ethylene-styrene, polyacrylates, polychloroprene, ethylene-vinyl acetate and poly (vinyl chloride).

22. The heat-setting label sheet of claim 13, wherein the film-forming binder is an acrylic dispersion.

23. The heat-setting label sheet of claim 13, wherein said film-forming binder is an acrylic dispersion, said water repellent is polyurethane dispersion and said plasticizer is a polyethylene glycol.

24. The heat-setting label sheet of claim 14, wherein said acrylic dispersion is an ethylene acrylic acid dispersion.

25. The heat-setting label sheet of claim 13, wherein the film-forming binder melts in the range of from about 65°C to about 180°C; said elastomeric emulsion has a Tg in the range of from -50°C to 25°C; and said polyurethane dispersion has a Tg in the range of from -50°C to 25°C.

26. The heat-setting label sheet of claim 13, which further comprises a polyethylene glycol.

27. The heat-setting label sheet of claim 13, wherein the film-forming binder is present in an amount of from about 46 to about 90 percent by weight; said elastomeric emulsion is present in an amount of from 1 to about 45 percent by weight; said polyurethane dispersion is present in an amount of from about 1 to about 8 percent; and said Adhesion Layer further comprises polyethylene glycol in an amount of from 1 to about 8 percent by weight.

28. The heat-setting label sheet of claim 2, wherein the image receiving layer comprises an ethylene acrylic acid copolymer dispersion.

29. The heat-setting label sheet of claim 13, wherein said film-forming binder is present in an amount of 86 percent by weight; said elastomeric emulsion is present in an amount of 5 percent by weight; said polyurethane dispersion is present in an amount of 4 percent; and said polyethylene glycol is present in an amount of 4 percent by weight.

30. The heat-setting label sheet of claim 29, wherein said polyethylene glycol comprises a polyethylene glycol mono ((tetramethyl butyl) phenol) ester compound.

31. The heat-setting label sheet of claim 13, wherein said elastomeric emulsion is selected from the group consisting of polybutadiene, polybutadiene derivatives, polyurethane, polyurethane derivatives, styrene-butadiene, styrene-butadiene-styrene, acrylonitrile-butadiene, acrylonitrile-butadiene-styrene, acrylonitrile-ethylene-styrene, polyacrylates, polychloroprene, ethylene-vinyl acetate and poly (vinyl chloride).

32. The heat-setting label sheet of claim 1, wherein said Adhesion Layer is present in a dry coat amount of from 5 to 30 g/m<sup>2</sup>.

33. The heat-setting label sheet of claim 2, wherein said image receiving layer is present in a dry coat amount of from 1.0 to 40 g/m<sup>2</sup>.

34. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a film-forming binder which melts in the range of from about 65°C to about 180°C; a wax dispersion; and a retention aid.

35. The heat-setting label sheet of claim 34, wherein the film-forming binder is selected from the group consisting of ethylene-acrylic acid copolymers, polyolefins, and waxes.

36. The heat-setting label sheet of claim 35, wherein the wax dispersion is selected from the group consisting of natural and synthetic waxes.

37. The heat-setting label sheet of claim 34, wherein the retention aid is selected from the group consisting of polyvinyl alcohols, polymer latexes and silicates.

38. The heat-setting label sheet of claim 1, wherein the Adhesion Layer has a melting point of at least 65°C and comprises (i) particles of a thermoplastic polymer having dimensions of about 1 to about 50 micrometers, from about 10 to about 50 weight percent of a film-forming binder, based on the weight of the thermoplastic polymer, and optionally from about 0.2 to about 10 weight percent of a fluid viscosity modifier, based on the weight of the thermoplastic polymer, (ii) about 15 to about 80 percent by weight of a film-forming binder selected from the group consisting of ethylene-acrylic acid copolymers, polyolefins, and waxes and from about 85 to about 20 percent by weight of a powdered thermoplastic polymer selected from the group consisting of polyolefins, polyesters, polyamides, waxes, epoxy polymers, ethylene-acrylic acid copolymers, and ethylenevinyl acetate copolymers, wherein each of said film-forming binder and said powdered thermoplastic polymer melts in the range of from about 65°C to about 180 degrees Celsius and the powdered thermoplastic polymer consists of particles of about 1 to about 50 micrometers, (iii) a film forming binder selected from the group consisting of ethylene-acrylic acid copolymers having particles of about 1 to about 50 micrometers, polyolefins, and waxes and which melts in the range of from about 65°C to about 180 degrees Celsius, (iv) a thermoplastic polymer having particles of about 1 to about

50 micrometers selected from the group consisting of polyolefins, polyesters, and ethylene-vinyl acetate copolymers and which melts in the range of from about 65 to about 180 degrees Celsius or, (v) a thermoplastic polymer having particles of about 1 to about 50 micrometers selected from the group consisting of polyolefins, polyesters, and ethylene-vinyl acetate copolymers, ethylenemethacrylic acid copolymers, and ethylene-acrylic acid copolymers and which melts in the range of from about 65 to about 180 degrees Celsius.

39. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises particles of a thermoplastic polymer having dimensions of 1 to 20 micrometers.

40. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises particles of a thermoplastic polymer having dimensions of about 1 to about 20 micrometers, from about 10 to about 50 weight percent of a film-forming binder, based on the weight of the thermoplastic polymer, and optionally from about 0.2 to about 10 weight percent of a fluid viscosity modifier, based on the weight of the thermoplastic polymer.

41. The heat-setting label sheet of claim 1, wherein the Adhesion Layer melts from about 65 to about 180 degrees Celsius and comprises particles of a thermoplastic polymer having dimensions of about 1 to about 20 micrometers, from about 10 to about 50 weight percent of a film-forming binder, based on the weight of the thermoplastic polymer, and from about 2 to about 20 weight percent of a cationic polymer, based on the weight of the thermoplastic polymer.



42. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises from about 15 to about 80 percent by weight of a film-forming binder selected from the group consisting of ethylene-acrylic acid copolymers, polyolefins, and waxes and from about 85 to about 20 percent by weight of a powdered thermoplastic polymer selected from the group consisting of polyolefins, polyesters, polyamides, waxes, epoxy polymers, ethylene-acrylic acid copolymers, and ethylene-vinyl acetate copolymers, wherein each of said film-forming binder and said powdered thermoplastic polymer melts in the range of from about 65 to about 180 degrees Celsius and said powdered thermoplastic comprises particles which are from about 1 to about 50 micrometers in diameter.

43. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a film forming binder selected from the group consisting of ethylene-acrylic acid copolymers having particles of about 1 to 20 micrometers, polyolefins, and waxes and which melts in the range of from about 65 to about 180 degrees Celsius.

44. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a thermoplastic polymer having particles of about 1 to 20 micrometers selected from the group consisting of polyolefins, polyesters, and ethylene-vinyl acetate copolymers and which melts in the range of from about to about 180 degrees Celsius.

45. The heat-setting label sheet of claim 1, wherein the Adhesion Layer comprises a thermoplastic polymer having particles of about 1 to 50 micrometers selected from the group consisting of polyolefins, polyesters, and

ethylene-vinyl acetate copolymers, ethylene-methacrylic acid copolymers, and ethylene-acrylic acid copolymers and which melts in the range of from about 65 to about 180 degrees Celsius.

46. A method of applying an image to a receptor element which comprises the steps of:

(i) imaging a heat-setting label sheet, wherein said heat-setting label sheet comprises:

(a) a support;

a pressure sensitive adhesive layer comprising at least one of a polyester, acrylic polymer, or copolymer blend, said polyester, acrylic polymer, or copolymer blend having a glass transition temperature ( $T_g$ ) of less than  $0^{\circ}\text{C}$ ; and

an Adhesion Layer comprising a thermoplastic polymer which melts in the range of  $50\text{-}250^{\circ}\text{C}$ , a wax which melts in the range of  $50\text{-}250^{\circ}\text{C}$ , or combinations thereof;

wherein said pressure sensitive adhesive layer is on the support and said Adhesion Layer is on the pressure sensitive adhesive layer;

or

(b) a support;

a barrier layer coated on the support, said barrier layer comprising (1) a vinyl acetate with a  $T_g$  in the range of  $-10^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ ; (2) a thermoplastic polymer having essentially no tack at transfer temperatures, a solubility parameter of at least  $19 \text{ (Mpa)}^{1/2}$ , and a glass transition temperature of at least  $0^{\circ}\text{C}$ , or (3) thermosetting polymers, ultraviolet curing polymers, or combinations thereof; and an Adhesion Layer coated

on the barrier layer and comprising a thermoplastic polymer which melts in the range of 50-250°C, a wax which melts in the range of 50-250°C, or combinations thereof; and

(ii) peeling said image and Adhesion Layer from said support, wherein said peeling occurs without water, heat, or chemical aids;

(ii) positioning the Adhesion Layer against said receptor element; and

(iii) applying heat to the Adhesion Layer.

47. The method of claim 46, wherein said imaging is provided by an electrostatic printer or copier.

48. The method of claim 46, wherein said imaging is provided by offset or screen printing.

49. The method of claim 46, wherein said imaging is provided by craft-type marking.

50. The method of claim 49, wherein said craft-type marking is selected from the group consisting of markers, crayons, paints or pens.

51. The method of claim 46, wherein said imaging is provided by ink jet printing.

52. The method of claim 46, wherein said heat-setting label sheet further comprises an opaque layer positioned on the Adhesion Layer, wherein said opaque layer comprises a styrene-butadiene latex, optional pigment, thermoplastic polymer, and elastomer.

53. The method of claim 52, wherein said heat-setting label sheet comprises a second opaque layer comprising vinyl acetate-ethylene copolymer, optional pigment, thermoplastic elastomer and elastomer, wherein said second opaque layer is coated on the opaque layer.

54. The method of claim 46, wherein said heat-setting label sheet comprises an image receiving layer coated on the Adhesion Layer which comprises at least one polymer which is capable of receiving and retaining water base colorants, said image receiving layer either does not melt when heat is applied or melts at a temperature above the melting temperature of the Adhesion Layer.

55. The method of claim 52, wherein said heat-setting label sheet comprises an image receiving layer coated on an opaque layer which comprises at least one polymer which is capable of receiving and retaining water base colorants, said image receiving layer either does not melt when heat is applied or melts at a temperature above the melting temperature of the Adhesion Layer.

56. The method of claim 53, wherein said heat-setting label sheet comprises an image receiving layer coated on said second opaque layer which comprises at least one polymer which is capable of receiving and retaining water base colorants, said image receiving layer either does not melt when heat is applied or melts at a temperature above the melting temperature of the Adhesion Layer.

57. The method of claim 46, wherein said heat is applied indirectly to the label.

-75-

58. The heat-setting label sheet of claim 1, wherein said Adhesion Layer is present in a dry coat amount of from 5 to 100 g/m<sup>2</sup>.